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The Design of Kansei Retrieving Method in a Digital Traditional Japanese Crafting Presentation System

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1. Introduction

In this paper, we propose a user-friendly three-dimensional CG presentation system for a typical Japanese crafting industry based on agent oriented Kansei information processing and virtual reality technology over high-speed network. In order to reflect the Kasei in persons, the correlation between the kansei words and the design elements of the crafting is analyzed and stored into the knowledge-base. Using this knowledge-base, user can interactively retrieve the desired craftings from the multimedia database distributed over the high-speed network and present those into the virtual space to design more creative house, and other buildings in real-time.

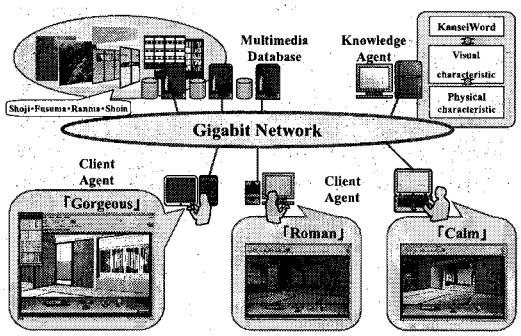

Fig.1：Digital Traditional Japanese Crafting Presentation System

2. Kansei Information Processing

The design element of the fittings as Japanese crafting can be characterized by visual feature which can be visually recognized by human beings and physical feature which can be physically and electronically recognized and processed by a computer as shown in Fig.2.

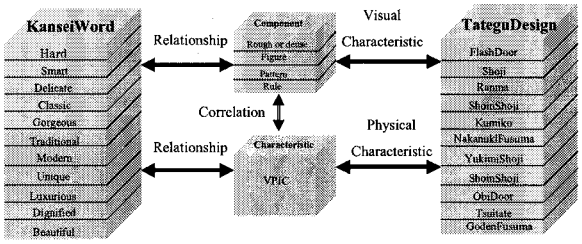

Fig.2：Kansei and Design Element

デジタル伝統工芸プレゼンテーションシステムにおける感性検索法の設計
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The correlation between the Kansei words and the visual feature and physical feature can be qualitatively and quantitatively derived by analyzing the result of questioner with the fittings and Kansei words and summarized into knowledge-base. Therefore, user can retrieve the desired fitting which is more suitable by the kansei words using the knowledge-base.

3. Relevance of a Kansei word and a Design Element

In the case of the fittings in Tatsuruhama-town, a typical traditional crafting industry area, a number of tiny wooden pieces consist of the fitting and express sophisticated design or geometric pattern as shown in Fig. 3..

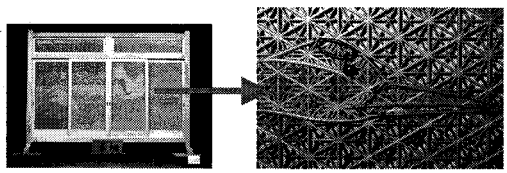

Fig. 3：Typical Design Pattern in Fitting

From the previous study, design patterns or elements as well as color can mainly be considered as Kansei information which stimulates human So far, we investigated the relationship between the Kansei words and design elements by conducting a questionnaire survey and analyzed numerically using Factor Analysis method. The results are summarized as knowledge as shown in Table. 1

KanseiWord	Roughness and Fineness	Figure	Original Parretn	Regularity	Color
Dignifered Luxurious Delicate	rought	square・ rhombus・ hexagon	straight	high	black・gold
Moredn Unique		square・ rhombus・sector	curce+ straight	 low	white・black warm color・ yellow＋yellow and green
Plain Calm	dense	square	curve straight	low high	white
Werm Unsophisticated	rougt				werm color yellow+black
Luxurious Light Simple Cool Smart	dense	square	straight		white・colorless
Gorgeous	rought				bright yellow
Hard		square	straight	high	black
Traditional				high	brown・black
Classic					white・black
Soft	dense		curve	low	white

Table1：Relevance of Kansei and Design Element

From this table, for instance, the " dignified fitting", means the one whose "roughness" and "fineness" are "dense", and "regularity" is "high", and "original pattern" is straight line.

On the other hand, visual correlation between the Kansei word and the design element can be also quantitatively clear from Factor Analyzing method. For example, the fittings with more precise and regular patterns are connected with "dignified" and "gorgeous" fittings. The shoji door with plain Japanese paper is related to "smart" and "simply". Kansei words.

4.Feature Extraction Method

In order to process the amount of the features of design pattern in fittings, VPIC (Visual Pattern Image Coding) is applied. VPIC can approximate the number predefined typed edges expressed by the blocks divided in fixed size[2] as shown in Fig. 3. Therefore, using VPIC, the amount of the features of the design elements in fittings can be is quantitatively evaluated. As a result, a unified quantization and automatic indexing of fittings are possible. Moreover, VPIC can quantitatively express such as density, regularity, shape and its size.

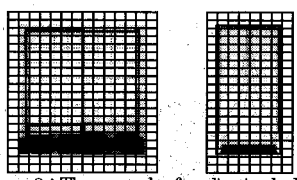

Figure3 : The example of application by VPIC

5. Flow of Retrieving

Based on the above analytical result, we developed and implemented Kansei retrieving method using graphical user interface(GUI) on the personal computer as a prototyped system. A user can simply issue a query by selecting the Kansei word through GUI. This query is converted into the equivalent numerical parameter as the physical feature or visual feature of the design element s based the knowledge base

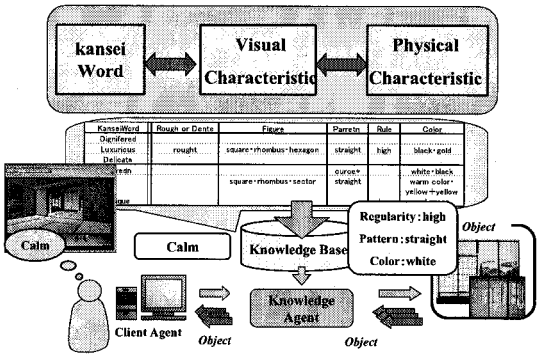

Figure4 : The Flow of Retrieving

For example, when the Kansei word ,"calm" is selected , this word is first converted to the visual feature, such as "high roughness and fineness" and "high regularity" from the knowledge base. Then those visual features are converted to the numerical parameters, "30% or more of totals of edge" and "50% of rates of distribution of each edge" by VPIC.

Those numerical parameter values are sent to the multimedia database distributed over high-speed network to retrieve the desired fitting data and eventually the retrieved data with 3DCG fitting objects are sent to the user to coordinate and construct the user's virtual space.

Thus, by repeating this operation, user can interactively improve the presentation space until attaining the desired virtual space with his/her best Kansei.

6. Prototype system

In order to evaluate the validation of our proposed system, we have implemented our prototype system using multiple SGI WSs and Windows PCs connected over JGN with 2.4 Gbps.

In this system, interactive and more realistic 3DCG presentation including open, and close function of fittings, lighting function, surround audio function and walking through function, etc. are realized using JAVA and VRML language.

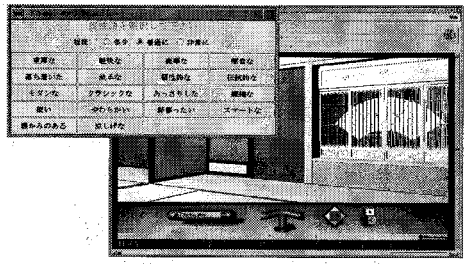

Figure5 : Example of Prototyped System

7. Summary and Future Works

In this paper, we have proposed and developed the Japanese traditional fitting system based on the kansei information processing. the correlation between the kansei words and the design elements of the crafting is analyzed and stored into the knowledge-base. Using this knowledge-base, user can interactively retrieve the desired craftings from the multimedia database distributed over the high-speed network and present those into the virtual space to design more creative house, and other buildings in real-time. Currently, in order to realize more accurate kansei presentation in the virtual space, we are investigating the correlation between the influence of various fittings to the virtual space and indivisual model which can reflect the difference of individual user Kansei.

References

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[2] D. Chen and A. C. Bovik : "Visual Pattern Image Coding" : IEEE Transactions on Communications Vo.38, No.12, pp2137-2145, December 1990.